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APRIL 30, 1949

SCIENCE NEWS LETTER

TECHNOLOGY DEPARTMENT

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THE WEEKLY SUMMARY OF CURRENT SCIENCE

Giant Rubber Fingers

See page 276

A SCIENCE SERVICE PUBLICATION

$5.50 A YEAR

VOL. 55 NO. 18

DETROIT PUBLIC LIBRARY TECHNOLOGY DEPT.

ASTRONOMY

Palomar's Big Glass Eye

A tiny bit of glass, which needs to be ground off, is hampering further work with the giant eye, which has already photographed stars of a billion years ago.

By MARTHA G. MORROW

Written at Mt. Palomar.

➤ THE big glass eye of Palomar is to have another try at seeing bright groups of stars way off in space. But first it must have a bit of glass, only a tiny fraction of an inch, ground off around its edge.

Already the best telescope in the world, the 200-inch Hale telescope has photographed groups of stars so distant that their light started on its way toward the earth more than a billion years ago. It has even now reached twice as far into space as Mount Wilson's 100-inch, the most keen-eyed telescope previously in operation.

Another set of tests is to be run on the gigantic mirror which was installed in the telescope in November, 1947. Then it will be removed from the supporting mechanism, and the extra glass that keeps it from giving maximum efficiency will be polished away right there on Palomar Mountain.

"My guess is that the mirror will be removed some time in May," I was told by Dr. Ira S. Bowen, director of Mount Wilson and Palomar Observatories. Officials of the California Institute of Technology and of the Mount Wilson Observatory are jointly responsible for its operation.

Only about twenty millionths of an inch —one wavelength—will be polished away on the average. This will be removed from the outer 18 inches of the telescope. But the amount to be removed is not exactly the same all the way around the mirror's edge. In some places practically none need be ground away, in others nearly twice this amount must be taken off.

Under ordinary seeing conditions, this additional polishing will make little difference in the quality of the finished picture. But on clear nights, when the telescope can peer far into space, this final grinding will enable it to trap light that originated even farther away from our tiny planet.

"It is our hope under good seeing conditions to increase the amount of light striking the photographic plate by as much as 20% to 25%," Dr. Bowen estimates. "Already capable of doing far more than any other telescope, we want to push it to the very limit before putting it into operation."

Six months or even more must be spent in polishing this gigantic mirror before the telescope can reach out as far into space as experts feel it should.

More than a year will have elapsed from the time the Hale telescope was dedicated (June 3, 1948) until it is performing to the satisfaction of its astronomer guardians. Some two years will have gone by since the mirror was moved up Mount Palomar and installed in the telescope.

Even before the mirror was moved from the Optical Shop at the California Institute of Technology, where it was painstakingly polished for about a decade, experts feared that more work on it might be necessary. But it was considered better to grind away too little than too much. At Cal Tech the mirror could be tested in only one position—standing on edge—and those responsible wanted to be sure before doing any more grinding.

A large number of test pictures have been taken to date, but no systematic research has been done. Many of these experimental pictures, however, taken with an eye to discovering just how well the telescope can perform at present and to estimating how much polishing is needed where, surpass all others in excellence.

Dr. Edwin P. Hubble of Mount Wilson and Palomar Observatories, a leading investigator of distant groups of stars, is already fast at work on these trial photographs. The plates have soaked up light from distant objects never before recorded here on earth. They tell of far-away nebulae whose light has not previously been captured by man.

These trial pictures and other photographs of the heavens to be taken with the 200-inch telescope when it begins to work at maximum efficiency will put at the disposal of astronomers eight times the volume of space now available. Some day, on the basis of this ever-growing file of pictures, Dr. Hubble and his associates hope to report to the world whether or not the universe of which our earth is but a minute part is actually expanding.

The 48-inch Schmidt telescope, little brother to the "big eye" and also located on Mount Palomar, is already busy laying the groundwork for the 200-inch Hale telescope.

Each clear night it scans the sky, looking for bright distant objects worthy of the mammoth telescope's time. For the next three or four years it will be used exclusively to survey all of the sky visible from southern California.

In use since last October or November, this mighty camera is the largest of the wide-eyed telescopes. Itself capable of reaching three hundred millions of light years out into space (a light year is the vast distance over which light, traveling 186,000 miles a second, passes in a year), it sees much more at a glance than the 200-inch telescope. The latter, which has already reached a billion light years out into space, pinpoints its vision on a tiny field only a quarter of a square degree in area.

Although the 200-inch mirror, to be re ground and put to work some time nex winter, is the primary and most importan mirror, the telescope will have six others Three of these are convex and three flat Being a reflecting telescope, it has no lenses only mirrors.

Already five of these mirrors have been completed and several are in place. The other is practically finished and will be ready when the big mirror swings into action. Even the spectrographs for fanning out the light of distant stars so it can be studied in detail are well under way.

When working at its best, the telescope is expected to be capable of trapping light that a billion years ago started on its way from a nebula of average brightness. But extremely bright nebulae may be even farther than that from our planet and still record their presence on the photographic film, explains Dr. Bowen.

In general astronomers can never be sure when they have reached beyond the dreamed-of billion light years and captured light from these most distant nebulae. The yardstick for measuring these gigantic distances is not very accurate, and the distances reached by the telescope can only be esimated on the basis of present information.

Science News Letter, April 30, 1949

BIOCHEMISTRY

Progress on Rat Killer Antidote Reported

➤ LEADS toward possible antidotes to poisoning by sodium fluoroacetate, the potent rat killer also known as 1080, were reported by two groups of investigators to the meeting of the Federation of American Societies for Experimental Biology in Detroit.

Giving more acetate, in the form of monoacetin, was the method tried by Drs. Maynard B. Chenoweth, Edward B. Scott and S. Louise Seki of the University of Michigan. When this was given a half hour before a certainly fatal dose of the poison, it prevented any symptoms of poisoning in 27 of 36 rabbits. Given during the latent or acute stages of poisoning, it was without much effect.

The antidotal action of acetate could be stepped up by giving it with ethyl alcohol, Drs. W. W. Tourtellotte and J. M. Coon found in experiments with mice at the University of Chicago Toxicology Laboratory.

They used sodium acetate, which the Michigan investigators had found to be of little or no use in protecting rabbits. But when this was dissolved in alcohol and injected into the mice's bellies, it saved from 90% to 100% of the animals poisoned with 10 times the dose of 1080 that would kill 50% of the animals. This was when the poisoned mice were treated immediately.

Science News Letter, April 30, 1949

MEDICINE

Separate Blood New Way

By adding to the blood extra fibrinogen, a protein in blood which aids clotting, the blood cells can be separated quickly and without damage.

▶ HUMAN BLOOD, which millions of Americans are donating to the Red Cross blood program, will be used in more ways to save more lives, thanks to a discovery reported at the meeting of the Federation of American Societies for Experimental Biology in Detroit.

The discovery is a new way to separate, rapidly and effectively, the red cells of blood from the white cells and other parts of blood. It was reported by Drs. Edward S. Buckley, Jr., Marvin J. Powell and John G. Gibson, II, of Harvard Medical School.

The new method not only separates the red cells but does it so fast and so gently that they are not damaged in the process. And it makes possible the recovery of the even shorter-lived, more fragile white blood cells for study and possible use of their germ-fighting ability.

Ordinary methods of separating red cells from blood plasma leave the red cells in a gluey mass of hurt cells that have very little medical use and are generally thrown down the drain. The red cells, however, are the important oxygen-carrying part of the blood. For about a third of the patients who get blood transfusions, red cells would not only be as good as whole blood but actually better.

The new method involves the use of fibrinogen, a protein of blood involved in the clotting process. Fibrinogen makes red cells pile up face to face like stacks of coins. It does this very fast. By adding enough extra fibrinogen to the blood as it is drawn from a blood donor's vein, the red cells will settle to the bottom of the flask in about 50 minutes, the Harvard team reported. Ordinarily it takes 24 hours or more for all of them to settle out of the plasma when the blood is allowed to stand.

In the same time about 80% of the plasma containing about 80% of the white blood cells is obtained. These white cells contain and some scientists think they manufacture the germ-fighting antibodies. Getting them out of the blood so fast, before they have time to disintegrate, will let scientists learn more about this germ-fighting ability and perhaps put it to use.

Platelets, which produce the substance in blood that starts the clotting process, also can be obtained with the new, speedy method of separating blood cells. The importance of this lies in the fact that many bleeding diseases are due to deficiency of platelets in the blood. The bleeding tendency caused by radiation from atomic bombs to X-rays is believed due to destruction by the rays of these blood particles. When enough of them become available for further study, scientists may find a way to use them to help patients with bleeding disorders, just as another part of blood can now be used to help hemophiliacs, persons with a different, hereditary bleeders' disease.

Credit for originating the method of using fibrinogen to separate red cells from the blood is given by the Harvard group to Drs. Allen H. Minor and Lee Burnett who developed it on a test tube basis at the Sloan-Kettering Institute, New York. The Harvard group modified it to use with pint quantities of blood such as are collected from Red Cross blood donors.

Science News Letter, April 30, 1949

MEDICINE

Bottom of Heart Warmer

The lower sixth of the heart is warmer because it lies on the diaphragm and liver. This finding may lead to better diagnosis and treatment of heart disease.

▶ THE lower part of the human heart is the warmer part. As a result, it recovers at a more rapid rate after contraction than the upper, cooler part. This and other findings expected to lead to better diagnosis and treatment of heart disease were reported by Drs. Louis H. Nahum and Hyman M. Chernoff of the Yale School of Medicine at the meeting in Detroit of the Federation of American Societies for Experimental Biology.

The new discoveries came from studies of electrocardiograms, the written record of the electrical impulses of the heart during each beat. But the Yale scientists make their electrocardiograms in a different way from that your doctor uses. Instead of attaching two electrodes to two parts of the body simultaneously, they use a single electrode. This, they find, provides a more accurate picture of the action of different parts of the heart.

With this method they were able to give the first complete explanation of what happens to a heart when the body suffers a loss of oxygen. A state of oxygen lack occurs during the first few minutes after a coronary thrombosis type of heart attack, during acute bleeding and at high altitudes.

At such times the electrocardiogram shows a peculiar pattern. The change, the scientists found, results from a more rapid recovery in various parts of the heart.

The fact that the lower sixth of the heart, which recovers more rapidly, is the warmer part has long been suspected but never previously determined. It is warmer because it lies on the diaphram and liver.

Differences in the rate of recovery of different parts of the heart show up in the wavy line, known as the "T-Wave" of the heart. The Yale doctors' report provides the first adequate explanation of this T-Wave and will help doctors to a more accurate diagnosis.

Physicians will be able to find exactly where a blood clot may have formed, where "skips" in heart beat originate and other baffling heart activities by applying the new theory presented for interpreting the electrocardiogram. This theory contradicts ideas held for a quarter of a century. It is based on the concept that it is the interaction of opposite electrical forces from different zones of the heart which creates

CANCER DETECTION — Dr. Charles Huggins, University of Chicago scientist, developed a blood test for cancer which is based on a disturbance of albumin, a protein, in the body. This promises to become an effective screening method for spotting early cancer cases. (See SNL, April 23, p. 259)

each electrocardiogram.

Much of the new information on interpretation of electrocardiograms was gained with the aid of X-ray pictures used to map the position of the heart while the electrocardiograms were being taken.

Science News Letter, April 30, 1949

PHYSIOLOGY

Spinal Cord Kept Alive

➤ NEW knowledge of how the central nervous system works, of different diseases affecting it such as convulsions, multiple sclerosis and even mental disease, and how morphine, caffeine and anesthetic drugs influence the nervous system is expected from research by two University of Chicago physiologists.

These men, Dr. Ralph W. Gerard and Robert T. Tschirgi, have succeeded in keeping a long section of the spinal cord of a rat alive and working outside the animal's body. The spinal cord with the brain makes up the central nervous system. The one and one-half inch section of the rat's cord which has been kept functioning outside the body corresponds to the part in a human from the bottom of the neck to the middle of the back.

This piece of spinal cord is cut out and placed in a small trough.

Functioning of the nervous system is maintained by continually feeding of synthetic or real blood through the cord arteries, first by a syringe and later by an elaborate pumping system.

To test the functioning of the spinal cord, the sensory nerve roots (the dorsal roots) are stimulated and the electrical impulse in the motor nerve roots (ventral roots) is measured after amplification on a cathode ray oscilloscope.

The reflex action of the spinal cord of the rat, Dr. Gerard and Mr. Tschirgi found, was generally lost in one or two minutes when oxygen was omitted from the fluid sent to the cord. If glucose were omitted, the reflex action was lost in two to four minutes. Even when activity is lost for over 30 minutes, full reflex activity can be restored in one to two minutes after re-adding the missing oxygen or glucose.

Five substances, the University of Chicago investigators discovered, can replace the normal glucose (simple sugar) as the source of energy to keep the reflexes in the nervous system active.

Until the new investigation, glucose was believed to be the only chemical capable of producing usable energy in the nervous system. The five substances substituting for glucose are: pyruvate, iso-citrate, alpha ketoglutarate, glutamine and glutamate, all related to sugars or proteins.

On the other hand, succinic acid which is also related to glucose and which is burned vigorously by tissue, including nervous tissue, was a failure in supporting reflex function. The isolated spinal cord used succinic acid even more than glucose, but succinic acid failed to support reflex response—the motor turned, but the car failed to run.

An additional dozen other common biologically important substances to the body, alcohol, acetate, lactate, and several of the amino acids, also failed to keep the reflex working.

Science News Letter, April 30, 1949

Common *mustard seed*, spread by the U. S. Forest Service on burned-over areas to get a quick soil cover, is sown in the ashes as soon as they cool off; the ashes anchor the seed against wind, thus giving it a quick start.

Question Box

ANTHROPOLOGY

What causes a receding chin? p. 281.

ASTRONOMY

How far has the telescope on Mt. Palomar penetrated into space? p. 274.

CHEMISTRY

From what may summer clothes be made in the future? p. 280.

ENGINEERING

What are the advantages of the new steel-making process? p. 278.

MEDICINE

What new way of separating blood has been discovered? p. 275.

What promises to relieve sufferers of rheumatoid arthritis? p. 277.

What two kinds of nerves are involved in itching? p. 280

PLANT PATHOLOGY

What kind of plants are plant breeders attempting to create? p. 282.

Photographs: Cover, Libbey-Owens-Ford Glass Co.; p. 275, University of Chicago; p. 277, Henry Rehder; p. 279, Westinghouse Electric Corp.; p. 282, p. 283, U. S. Dept. of Agriculture.

On This Week's Cover

➤ A "BLANK" of glass, behind which the workman is seen fuzzily, is lifted off the production line by rubber suction cups. The glass is on its way to the grinding line in the Rossford, O., plant of Libbey-Owens-Ford Glass Company, where it will be transformed by grinding and polishing into a transparent clear glass.

Science News Letter, April 30, 1949

SCIENCE NEWS LETTER
VOL. 55 APRIL 30, 1949 No. 18

49,100 copies of this issue printed

The Weekly Summary of Current Science, published every Saturday by SCIENCE SERVICE, Inc., 1719 N St., N. W., Washington 6, D. C., NOrth 2255. Edited by WATSON DAVIS.

Subscription rates: 1 yr., $5.50; 2 yrs., $10.00; 3 yrs., $14.50; single copy, 15 cents, more than six months old, 25 cents. No charge for foreign postage.

Change of address: Three weeks notice is required. When ordering a change, please state exactly how magazine is now addressed. Your new address should include postal zone number if you have one.

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Printed in U. S. A. Entered as second class matter at the post office at Washington, D. C. under the act of March 3, 1879. Established in mimeographed form March 18, 1922. Title registered as trademark, U. S. and Canadian Patent Offices. Indexed in Readers' Guide to periodical Literature, Abridged Guide, and the Engineering Index.

Member Audit Bureau of Circulation. Advertising Representatives: Howland and Howland, Inc., 393 7th Ave., N.Y.C., PEnnsylvania 6-5566 and 360 N. Michigan Ave., Chicago, STAte 4439.

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MEDICINE

New Rheumatism Remedy

Called "compound E" for short, the new drug is a hormone produced by the outer part of the adrenal gland. It will be some time before it is available.

➤ NEXT year some time sufferers from the kind of rheumatism called rheumatoid arthritis will begin to get help from a new drug. Only a few of the thousands of arthritis sufferers will be able to get this help even then, because of the difficulties of producing the drug. But probably enough will get it so that doctors can tell just how to use it for best results and how to avoid unpleasant side-effects if any should develop.

The new drug is a hormone produced by the outer part of the adrenal gland. Called "compound E" for short, its full scientific name is "17-hydroxy-11-dehydrocorticosterone." The tiny amounts so far available have been given to 16 patients at the Mayo Clinic in Rochester, Minn.

Each patient began to get better within a few days, Drs. Philip S. Hench, Edward C. Kendall, Charles H. Slocumb and Howard F. Polley report in the PROCEEDINGS OF THE STAFF MEETINGS OF THE MAYO CLINIC.

The arthritis pains and aches and stiffness came back when the doctors stopped giving the drug as they sometimes had to because of the scanty supply and sometimes did to learn whether the drug was having a lasting remedial effect. Apparently patients will have to go on taking it regularly in order to stay relieved of the arthritic symptoms and disability.

The hormone is given by injection into the muscles. Besides compound E, the Mayo physicians are trying some related hormones. One of these is a pituitary gland hormone which stimulates the adrenal gland to produce its cortical hormone. This also helped, but the supply of it depends on the supply of pituitary glands.

Compound E has been partially synthesized as a result of a long series of biochemical investigations carried out cooperatively by Dr. Kendall and his associates at the Mayo clinic and chemists of Merck and Co. The starting material must pass through more than 30 intermediate steps which can only be carried out by experienced chemists. This accounts for the excessive rarity of the material. Although production is being expanded, Merck and Co. state, regretfully, that no supplies are expected before 1950 and then only small amounts will be available.

The trial of compound E resulted from research by Dr. Hench dating back to 1929. At that time he noted that arthritic patients were unexplainably relieved of pain if they got jaundice and that women were also relieved of the arthritic pain when they became pregnant. And, as is well known, rheumatoid arthritis itself sometimes is dramatically halted with no known explanation.

This led Dr. Hench to the theory that "within every rheumatoid patient corrective forces lie dormant, awaiting proper stimulation."

The fact that some arthritis patients are temporarily better after an operation and anesthesia hinted at an adrenal gland factor. This is because during anesthesia and surgery the outer part, or cortex, of the adrenal glands is stimulated. When compound E finally became available, even though in tiny amounts, in September, 1948, its trial as an anti-arthritis drug was started.

Science News Letter, April 30, 1949

ENGINEERING

Liquid Oxygen Converter

➤ LIQUID oxygen will probably replace much of the highly compressed gaseous form now used in applications ranging from medical to industrial, and particularly for airplane crews flying at high altitudes. A new liquid oxygen converter, developed by W. A. Wildhack and associates of the National Bureau of Standards, will be responsible.

The converter is fully automatic, requiring no electric or other source of power. Its compactness and greatly reduced weight represent a decided advance over gaseous equipment now used to supply breathing oxygen in aircraft. Oxygen in liquid form, for pilots and personnel is already under flight testing by the U. S. Air Force in a B-17 at Wright-Patterson base in Ohio.

In addition to its use in aviation, gaseous oxygen has many other applications in modern science and technology; in the welding and cutting of metals, in manufacturing and refining processes, in the operation of certain types of engines and rockets, and in medical treatment.

For all of these uses, both weight and bulk of containers can be greatly reduced if the oxygen is stored in liquid form. Liquid oxygen is five times as dense as oxygen gas under a pressure of 2,000 pounds per square inch, the pressure used with most standard oxygen tanks.

Although the advantages of supplying oxygen in liquid form have long been recognized, its widespread use has been prevented by the disadvantage of continuous evaporation losses during storage and the necessity of controlling the build-up of pressure to that required for operation. About 50 pounds per square inch is needed for oxygen breathing regulators. The new Bureau of Standards converter solves these problems.

Briefly, it is a thermos bottle, a double-walled container with a vacuum between the walls, which scientists call a Dewar flask. The size used by the Bureau has a capacity of about 3.5 gallons. The flask is modified from the simple form by the addition of a bottom drain, together with two coils, one for build-up of pressure and one for warming the gas as it is delivered.

In reliability and safety the new converter compares favorably with high-pressure gaseous oxygen systems. Wide variation is possible in container capacity, and in delivery flow, temperature and pressure specifications. Thus, while designed specifically for aviation use, it can be used for other purposes.

Science News Letter, April 30, 1949

CARNIVOROUS CORSAGE—The ornament this girl is wearing comes from a Southern species of pitcher-plant, a bog-dweller with water-holding hollow leaves that trap unwary insects and use their bodies for food after they drown. Although the corsage appears to be made up of their flowers, and the objects are called "biscuit flowers," they are actually the seed-bearing structures left after the petals have dropped off. This ornamental use of pitcher-plant seed stalks was dreamed up by a florist of Wilmington, N. C., Henry Rehder.

ENGINEERING

New Steel-Making Process

➤ JETS of air, directed across the surface of white-hot liquid pig iron, feature a new steel-making process which gives a product of open hearth quality, low in phosphorus and nitrogen, revealed in Pittsburgh, by the Carnegie-Illinois and the Jones and Laughlin steel corporations which collaborated in its development.

Credit was also given by these companies to C. E. Sims, of Battelle Memorial Institute, Columbus, Ohio, who assisted with research proposals. The metallurgical feasibility of the new process has been demonstrated by the results of preliminary tests using small-scale units. A full-size furnace in which operating problems can be studied experimentally is to be erected.

The vessel in which the process is carried out is a "turbo-hearth." The turbo-hearth was developed in an attempt to combine the advantages of the basic open hearth and acid Bessemer processes, the leading methods now followed by steel-makers in the United States. Turbo-hearth steel is made in a partly closed, side-blown vessel, lined with refractory material similar to that used in the Thomas basic Bessemer process.

The brick lining is magnesia rather than silica. As in the Bessemer process generally, heat is supplied by chemical action of the blown air with carbon and other elements of the charge. Chemical action is fast and direct, but subject to controlled conditions which reduce the nitrogen and phosphorus contents, making turbo-hearth steel comparable to open hearth steel, hence suitable for more general use than the customary Bessemer steel.

The high-silicon iron used in the Bessemer converter and the high-phosphorus iron in the Thomas operation are required largely because carbon, the predominating heat-producing element in the charge, is not completely utilized. Combustion of the carbon proceeds only to the carbon monoxide stage, so that two-thirds of the potential heat from the combustion of carbon is lost when the carbon monoxide burns to carbon dioxide in the air outside the vessel.

Conservation of this heat has been accomplished in some cases by the introduction of air at the side or on the surface of the converter charge in sufficient quantities to cause complete burning inside the vessel. This suggested the new development, one in which jets of air are directed on the surface of the liquid iron, providing extra heat for more complete combustion.

Science News Letter, April 30, 1949

MEDICINE

New Anti-Cancer Weapon

➤ A NEW anti-cancer weapon that puts a sharp pencil of killing particles at the center of a cancerous mass inches below the skin's surface has been produced through use of the world's largest operating cyclotron at the University of California radiation laboratory.

Cancer specialists have long wanted a method to irradiate small deep-seated locations without radiation scattering that damaged surrounding tissue. If extended later to human application, research reported by Dr. C. H. Tobias, Dr. John H. Lawrence and Harold Anger of the University of California and Dr. Paul Rosahn of Yale to the American Association for Cancer Research in Detroit will achieve this objective.

Deuterons, which are double-weight hydrogen particles, were accelerated to the ultra-high energy of 190,000,000 electron volts in the cyclotron. They were used to bombard mice with breast tumors, much as X-ray or radium would be used. Forty percent of mice with ordinarily 100% fatal tumors were saved.

The experiments were the first to fulfill the hopeful prediction that high-energy particles would have greater ionization and cancer tissue-destroying effect at considerable depth than on the skin. Most ionization effect occurs at five and one-half inches deep. Relatively small damage is caused in tissue between this depth and the surface. A spot as small as three-eighths of an inch can be attacked.

Science News Letter, April 30, 1949

GEOLOGY-ENGINEERING

Caves And Mines May Not Protect Against A-Bomb

➤ CAVES and mines may not be adequate protection against stresses caused by "known and projected bombs and guided missiles," presumably including the atomic bomb, George A. Kiersch of the U. S. Corps of Engineers, Sacramento, told a meeting of the Cordilleran section of the Geological Society of North America in Berkeley, Calif.

Mr. Kiersch stressed that his opinions are his own and not necessarily views of the Corps of Engineers.

He said that detailed scientific surveys are needed to determine where and how best to construct subterranean installations strong enough to resist the new weapons.

Such installations cannot be built in just any kind of rock formation, he pointed out. Consideration must be given to inherent weaknesses in the rock, possible active stresses, ground water level and water supply requirements.

He feels any relocation of industry underground would be only a small percent of a nation's national production. The idea of great cavernous areas underground does not agree with geological engineering facts. Such structures would have to be based on the same principles as mines or caves; greater the space, greater the stress from overloading.

If a bomb was dropped on an overloaded area, it might be a second stress which might cause cave-in.

Mr. Kiersch stressed that there are many types of rocks with different strengths and other variable factors. Simply going a certain depth underground does not give protection. Some existing mines, caves might be useful, but only if they meet certain scientific specifications, many of which still have to be worked out.

Science News Letter, April 30, 1949

GEOLOGY

"Earthquake Weather" and Moon May Set Off Tremors

➤ "EARTHQUAKE weather" and even the influence of the moon might be studied by scientists trying to learn more about quakes such as the one which rocked the Northwest April 13.

These suggestions were made at a meeting of earthquake scientists in Berkeley, Calif., by Prof. G. E. Goodspeed, head of the department of geology at the University of Washington. Dr. Goodspeed missed the Seattle earthquake because he was on his way to this meeting of the Seismological Society of America.

He explained that "earthquake weather" which often occurs in California comes when a low pressure area moves in, lowering the barometric pressure. This makes a difference of thousands of pounds of pressure per square foot. It might be "the straw that breaks the camel's back" in setting off a quake, he suggested.

Eclipse of the moon April 12, hours before the tremor, points up the need for considering any possible relationship between the moon and earthquakes, Dr. Goodspeed contended.

Geologic cause of the Northwest's quake, however, was a fault in the earth east and parallel to the Olympic Mountains, the University of Washington geologist said.

The fault, tens of millions of years old, lies 1,000 feet below glacial deposits laid down 10,000 to 20,000 years ago. These deposits have made it difficult to study the fault, but it may compare with the famed San Andreas fault, which gets the blame for many of California's worst shakings.

Science News Letter, April 30, 1949

ASTRONOMY

Find Near Star-Neighbor

What may be our second nearest star-neighbor in space has been newly discovered. It is also the closest star that can be seen from most of the U. S.

➤ DISCOVERY of a star—believed to be our second nearest star-neighbor in space and the closest one which can be seen from most of the United States—has been announced.

Dr. Willem Luyten of the University of Minnesota reported that the star was spotted by comparing photographic plates which he made at the Harvard College Observatory's South African Station in 1930 with plates taken by the Harvard Observatory in 1944. Discovery was reported to the American astronomical clearing house at the Harvard Observatory.

Observations made with the 36-inch reflector at Tucson, Ariz., indicate that light from the star takes perhaps less than six years to reach the earth. Only Alpha Centauri, four and a half light years away, is nearer, but it is visible chiefly from the southern hemisphere. If the Tucson observations are confirmed, the new discovery will be second only to Alpha Centauri in nearness to the earth.

You will not be able to see the new find without the aid of a powerful telescope: it is 100 times too faint to be seen with the naked eye.

The newly-found star will be called L-726-8. It was found in the constellation Cetus, the whale.

Studied through observatory telescopes, it has been found to be a double star. It is actually two stars revolving around each other, at a distance about three times greater than that from the earth to the sun. Both of the stars are extremely red in color. They are much cooler than our sun, actually giving 40,000 and 60,000 times less light than the sun. They are surrounded by huge clouds of incandescent hydrogen and calcium gas.

Already one of the stars has made astronomical history—through an atomic explosion. Last Dec. 8, the fainter of the two stars was seen to flare up suddenly to 12 times its normal brilliance, and subside again in less than 20 minutes. This phenomenon is thus far unique among stars.

It is fortunate that this is unprecedented, because if it ever happened to our sun, we on earth would have a very uncomfortable, hot quarter of an hour, a "hell on earth."

In the very faint, cold star, the atomic explosion, for such it must have been, amounted to the equivalent of a billion atomic bombs of the Hiroshima type.

Dr. Luyten pointed out that his discovery shows the international and cooperative character of astronomy. The Minnesota astronomer obtained plates and observations on which his conclusions are based from the Harvard Observatory Station at Bloemfontein, South Africa; the University of Arizona's observatory at Tucson; the McDonald Observatory in Texas; Mount Wilson Observatory in California; and the Union Observatory, Johannesburg, South Africa. His research was made possible by grants made by the University of Minnesota graduate school and the Gould Fund of the National Academy of Sciences.

Science News Letter, April 30, 1949

METEOROLOGY

Predict Weather for Year

➤ WEATHER forecasts made a year ahead have been "fulfilled with an exceptionally high degree of accuracy," the Smithsonian Institution announced.

The long-range forecasts, for the nation's capital, were made by the retired secretary of the Smithsonian, Dr. Charles G. Abbot, now a research associate.

In January, 1948, the Institution disclosed, Dr. Abbot forecast 55 dates when the temperature in Washington would drop to a low and start rising. The dates were locked in a safe and opened this year. Checked against U. S. Weather Bureau records, the forecasts seemed to stand up well, with 48 of the 55 dates having lower temperatures.

Meanwhile Weather Bureau scientists, using Dr. Abbot's dates, have discovered that the Smithsonian scientist's conclusions seem to apply both as stated and also more or less in reverse.

Dr. Abbot predicted that between his "cold days" there would be warmer days averaging 7.1 degrees Fahrenheit warmer. The actual average of the highest mean daily temperatures for the days between "cold days" proved to be 6.96 degrees warmer.

Weather Bureau scientists checked to see how many times there was a lower mean daily temperature than the "cold days" between the dates. They found cooler temperatures, averaging 6.6 degrees below the "cold days" for 45 of the 55 dates. Thus, it appears that the "cold days" also may be "hot days."

Spurred on by this development, Bureau statisticians are now making a further study of Dr. Abbot's figures.

A Washington area forecaster explained that a peak temperature for a few-day period is frequently followed within a day or two by the low, because of the rush of cold air. This quick cooling and more gradually warming is quite generally found in middle and northern latitudes, he added.

The Smithsonian researcher's forecasts are based on his previous finding of a periodicity in the sun's heat radiation of 6.6456 days. Effects on the earth of this radiation period may be speeded or delayed by one or two days due to the complexity of the earth and its atmosphere, Dr. Abbot explains.

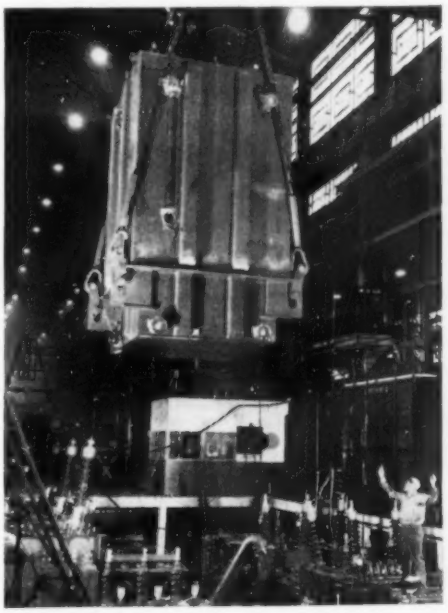
The long-range predictions give a general pattern, and details can be filled in by local weather observations, he points out.

A Weather Bureau spokesman said that the Smithsonian scientist's "primarily statistical" approach to weather forecasting is not accepted generally by weather scientists.

"Three days is about our limit," he conceded.

Dr. Abbot has repeated his prediction for this year, with a new list of 55 "cold days" in Washington for the current year. They show a relatively cool Fourth of July this year and a relatively warm Christmas for the District of Columbia.

Science News Letter, April 30, 1949



***TRANSFORMER FOR POWER—** Detroit's power supply will be boosted by this powerful transformer which is capable of handling 195,000 horsepower of electrical power. The unit is rated at 145,000 kilovolt-amperes and weighs 121 tons. It is shown here at the Westinghouse company's transformer test pit.*

MEDICINE

Vaccinations Are Needed For Foreign Travel

➤ IF YOU are going abroad on business or pleasure, you will need to have certain vaccinations against various diseases. You will not be able to enter the United States, even if you are an American citizen, without a certificate showing satisfactory evidence of vaccination against smallpox within the three years before entering this country. There are a few exceptions to this, such as for travelers from Canada, Bermuda, and the Bahamas. The vaccination should be done at least two weeks before you leave this country, and the reaction at the site of vaccination should be carefully observed and recorded on the third and ninth days after vaccination.

For your own protection, you are advised by the U. S. Public Health Service to be immunized against typhoid and paratyphoid fevers. This is done in three "shots" at intervals of seven to 10 days.

If your work abroad may put you in danger of accidents or piercing or crushing wounds, you should also get shots against tetanus, popularly known as lockjaw. This calls for two doses at four- to six-week intervals, or of three doses at three- to four-week intervals, according to which preparation is used.

Children under 15 years going any place overseas should be given shots against diphtheria. Grown-ups under 35 years should have a Schick test and if this is positive, should be immunized also.

Besides these immunizations, you will need shots against typhus, cholera and yellow fever if you are going to or through certain countries where the diseases exist. In order to avoid delays, it is best to get these before you leave home, and to have the proper entries for them made on an International Certificate of Inoculation and Vaccination. A blank for this certificate will be sent you with your passport when that is issued by the Department of State.

More information on these requirements can be obtained from the U.S. Public Health Service, Washington 25, D. C.

Science News Letter, April 30, 1949

CHEMISTRY

Cooler Summer Clothes May Come from Seaweed

➤ COOLER summer clothes may come in the future from using man-made seaweed.

The synthetic seaweed fibers have been used to weave very light, delicate woolen and cotton materials. This new process was described to the American Chemical Society meeting by Drs. J. David Reid and George C. Daul of the U. S. Department of Agriculture's Southern Regional Laboratory in New Orleans.

Seaweed-like fibers are prepared from wood, cotton or other forms of cellulose. They are spun in much the same way as rayon or nylon. These fibers are woven into a fabric and later washed out by soapy water to produce fluffy and porous materials.

It also is possible to weave the man-made seaweed fibers into special patterns which give unique, novelty fabrics when dissolved out.

Fluffier fabrics made by this dissolving-out method could be used for such things as summer suits, men's undershirts, ladies' blouses or lace curtains.

Science News Letter, April 30, 1949

MEDICINE

Two Kinds of Nerves Are Involved in Itching

➤ IT TAKES two kinds of nerves to make an itch, Drs. David T. Graham and Helen Goodell of New York Hospital-Cornell Medical College reported at the meeting of the Federation of American Societies for Experimental Biology in Detroit.

One of the nerves involved in itching is a "fast" nerve. The other is a "slow" one.

The scientists found out about the nerves involved in itching sensations by putting cowhage on the skin of the forearms or backs of human volunteers. Cowhage, also known as cowitch, is a nettle plant with hairy leaves and stems that cause unbearable itching.

The itch resulting from cowhage applications has two parts:
1. a superficial pricking and 2. a deeper burning sensation. Cutting off the blood supply temporarily to the forearm abolished the superficial pricking part of the itching but not the deeper burning sensation. Blocking a skin nerve by injecting the local anesthetic, procaine, prevented the burning itch but let the pricking itch develop.

The pricking part of itching is carried by fast nerves while the burning part is carried over slow nerves, the scientists reported. These are the rapidly and slowly conducting pain nerve fibers from the skin.

Pinpricks in an itching area or in areas adjacent to it or in the same area of nerve supply, even 11 or 12 inches from the itching area, stop the itching for 20 to 60 seconds.

In another experiment, the scientists applied an interrupted electric current over a skin nerve. This made the whole area extremely sensitive to pain. After this pain had gone, cowhage was applied. It induced either pain or no sensation, but not itch.

To understand the nerve mechanisms concerned in itching, their experiments show, it is necessary to consider not only phenomena near the surface of the body but also processes in the central nervous system, presumably in the spinal cord.

Dr. Graham hoped the studies would give some clues on what to do to stop itching, but so far they have not.

Science News Letter, April 30, 1949

IN SCIEN

BIOLOGY

Fertility Hormone Is Isolated in Pure Form

➤ THE follicle-stimulating hormone, a pituitary gland secretion which holds sway over fertility in both men and women, has been isolated in pure form for the first time.

This was reported to the meeting of the American Society of Biological Chemists in Detroit by Dr. C. H. Li, noted scientist of the University of California's Institute of Experimental Biology.

Called FSH, the hormone stimulates the growth of the ovarian follicles in the female, paving the way for ovulation, while it may stimulate the sperm-producing tubules in the male.

Dr. Li said the hormone may be suitable for human use. Its availability in pure form will open up a whole new field of research in reproductive physiology, which eventually might lead to benefits for mankind. The scientist stressed, however, that the hormone will be used in animal experimentation for the present.

Pure FSH is almost crystalline, and chemically it is a protein as are the other pituitary hormones.

FSH is one of two fertility hormones. Its action is the initial preparation for fertility, while the second one, the interstitial cell-stimulating hormone, takes over in the second stage.

Dr. Li has now isolated five pituitary hormones: FSH, the interstitial cell-stimulating hormone; the lactogenic hormone, which stimulates the production of milk in new mothers; the adrenocorticotrophic hormone, which regulates the function of the adrenal gland; and the growth hormone, which regulates growth.

Science News Letter, April 30, 1949

MEDICINE

New Evidence Found That Virus Can Cause Cancer

➤ NEW evidence that a virus can cause at least some types of cancer has been reported by an English researcher.

Dr. Ida Mann of the Imperial Cancer Research Fund in London has successfully transmitted spontaneous mammary cancer in mice, using dried cancer tissue. Last month, Dr. W. E. Gye, director of the Fund, announced that he had transmitted chemically-induced cancer in mice, indicating a virus cause. In Dr. Mann's experiment, the cancer was not induced artificially by chemicals.

Science News Letter, April 30, 1949

E FIELDS

ANTHROPOLOGY

Dispel Myth That Receding Chin Indicates Weakness

➤ DENTISTS at the University of California have pretty well dispelled the myth that a receding chin has any connection with inherited character weakness.

Facial features, a study at the Univerity's College of Dentistry shows, seem to be more the result of physiological dice shaking by nature than anything else.

Oddly enough, report Drs. Wendell Wylie and William A. Elsasser in the AMERICAN JOURNAL OF PHYSICAL ANTHROPOLOGY, a long cranium is often the cause of the receding chin.

The upper jaw is hinged to a forward part of the skull, the dentists explained, while the lower jaw is hinged to the middle and back of the skull. A little added length to the cranium pulls the lower jaw back far enough to give the receding chin effect, with malocclusion, even though both features are normally developed.

Other causes of receding chin are overdevelopment of the upper jaw or underdevelopment of the lower jaw. The study indicates the condition is caused more often in males by overdevelopment of the upper jaw and in females by underdevelopment of the lower jaw.

The study was made with a cephalometer, an instrument for making precise head measurements. Subjects were male and youngsters in need of orthodontic treatment and a comparable group of normal youngsters.

Science News Letter, April 30, 1949

PSYCHIATRY

Mental Hospital Aide of The Year Gets $500 Award

➤ BECAUSE, like a modern Pinel, he successfully abolished cuffs, camisoles or straight jackets and other restraints on mentally sick persons in his care, Roland J. Brand, an attendant at the Milwaukee, Wis., County Asylum has been named "Psychiatric Aide of the Year" for 1948.

With the citation goes a $500 cash award, Richard Hunter, executive secretary of the National Mental Health Foundation, stated in announcing the award. This foundation and the Catherwood-Kirkbride Fund for Research in Psychiatry are joint sponsors of the award.

Five other candidates who reached the finals in the competition are being cited for Honorable Mention. They will receive $50 awards and appropriate citations for their exemplary performances in the care of the mentally ill. They are: Mrs. Elizabeth Guy, St. Elizabeth's Hospital, Washington, D. C.; Mrs. Zella Bauer, Chicago State Hospital, Chicago, Ill.; Joe Collins Hisle, Jr., Veterans Administration Hospital, Lexington, Ky.; John Robert Hull, Ypsilanti State Hospital, Ypsilanti, Mich.; and Thomas R. Cobb, Jr., Veterans Administration Hospital, Roanoke, Va.

Every mental hospital in the country, both public and private, was given an opportunity to nominate the attendant or psychiatric aide on its staff who had turned in most meritorious performance during 1948. In all, more than 15,000 eligible candidates were considered by hospitals throughout the country before the final selections were made by a board of judges, prominent in the field of mental health.

Science News Letter, April 30, 1949

METEOROLOGY

New Thunderstorm Warning Service Utilizes Radar

➤ RADAR warnings of thunderstorms at least 30 minutes in advance will enable airlines, ships and electric light companies to "get set" this summer in New York City.

Radar equipment, installed by the U. S. Weather Bureau, on the top of the Whitehall Building, will give an accurate picture of when and where the storm will strike. Plans for the new project were disclosed by Weather Bureau scientists at the meeting of the American Meteorological Society in Washington.

Radar can also be used to determine the amount of rain which falls on any given area. Donald C. Bunting and Marinus H. Latour, of the University of Florida, compared the amount of rainfall as found from radar measurements and from actual rain gage measurements. Knowing the amount of water which falls in a certain area is important in flood control work.

Radar equipment designed especially to detect storms was described by Lester A. Zurcher of Evans Engineering Laboratories. William B. Gould of the same laboratory reported that radar is being used to determine the exact heights of clouds.

Dr. F. W. Reichelderfer, chief, U. S. Weather Bureau, explained that radar enables the weather man to "see" the weather for 150 miles instead of five miles. As new equipment is developed specifically for weather work, radar will become more and more valuable, he predicted.

At the present time two weather stations can measure the rate of weather movement accurately only when the movement is in a straight line between them. If these same two stations were equipped with radar, they could predict from a radar fix the rate of weather movement at any angle between them.

Science News Letter, April 30, 1949

NUCLEAR PHYSICS

Dust Is an Atomic Bomb Hazard, Study Shows

➤ ADD atomic age hazards: dust in the air.

This finding—of a new danger from an atomic bomb blast—comes from behind the Iron Curtain. The experiments were made in a laboratory near Prague, Czechoslovakia, not at the site of an A-bomb explosion.

C. Jech of the department of physics of the Radiotherapeutical Institute, Prague-Bulovaka, reported his findings to the British scientific journal, NATURE (April 9).

The radioactive gas, radon, was found to leave a deposit on glass, the scientist explains. His tests showed that this was caused by the radioactive atoms clinging to dust.

"It is reasonable to suppose that artificial radioactive atoms, for example, atoms left in the air by the explosion of an atomic bomb, will similarly be adsorbed on (cling to) dust particles," concludes the Czechoslovakian scientist.

Science News Letter, April 30, 1949

GENERAL SCIENCE

Reorganize Agricultural Board of Research Council

➤ THE Agricultural Board of the division of biology and agriculture of the National Research Council has been recognized and will serve as an independent scientific review body, the Council has announced.

Jobs of the newly-reorganized board will include advancing and interpreting scientific knowledge pertaining to agriculture, initiating and providing recommendations relative to agriculture and disseminating the group's technical and deliberative conclusions.

Dr. Roy C. Newton, director of research for Swift and Company, Chicago, is chairman of the new board. Dr. Leonard A. Maynard, director of the Cornell University School of Nutrition, is vice-chairman, and Dr. LeRoy Voris of the NRC Food and Nutrition Board is acting executive secretary.

Members of the Board named thus far are:

Dr. R. V. Boucher, Pennsylvania State College; Dr. J. S. Davis, Food Research Institute of Stanford University; H. R. Guilbert, University of California; Prof. W. A. Hagan, New York State Veterinary College, Cornell University; Dr. W. E. Krauss, Agricultural Experiment Station, Wooster, Ohio; Prof. W. J. Loeffel, College of Agriculture, Nebraska; Dr. L. C. Norris, Cornell University; Dr. B. T. Simms, Bureau of Animal Industry, U. S. Department of Agriculture; and Dr. W. W. Spink, University of Minnesota Medical School.

Science News Letter, April 30, 1949

PLANT PATHOLOGY

Hardy Plant Parents Hunted

Disease-resistant varieties of flowers and vegetables are being sought around the world so that they can be crossed with commercially popular varieties.

By MARTHA G. MORROW

➤ A SEARCH for parents is under way. These wanted parents, of flowers and vegetables that will some day flourish in your garden, are needed because of their ability to resist disease.

From your own back yard, plant specialists go all over the world hunting disease-resistant and hardy plants that can be used in producing new and improved vegetables for our own country. They search for cantaloupes in India and Iran, for peas and watermelons in Africa and the Near East. To many parts of Asia they travel for onions, to South America for tomatoes, to Central and South America for beans and sweet potatoes, and to Europe and South America for Irish potatoes.

When an SOS is sounded by gardeners in a certain section of the country who fear that their entire crop may be wiped out by blight, the search begins. Hundreds and even thousands of varieties may be tried before one that is immune, or even highly resistant to the particular disease, is found.

When a resistant plant of one of the commercial varieties is discovered thriving in an infected field, the task of packing disease-resistance into a superior variety is relatively simple. But when a commercially worthless and practically inedible cousin must be used as an "ancestor," the task is much slower and harder.

As Good or Better

Plant breeders in every case aim to create a disease-resistant plant that is at least as good as the present commercial varieties, and perhaps a bit better. When a new variety can be grown on infected soil, for example, but is merely acceptable otherwise, the battle is only half won. Additional types must be created until superior plants are available.

This breeding of disease-resistant plants is often a cooperative undertaking. It is frequently initiated by the U. S. Department of Agriculture in response to a plea for help from growers whose fields are being devastated by wilt or mosaic.

The Department usually works along with state experiment stations. Sometimes the government experts specialize in hunting for disease-resistant varieties, trying to breed such resistance into edible plants. State agriculturists may then conduct experiments designed to discover more about the disease itself—what it is, how it spreads and chemical methods for controlling it. Seedsmen and local growers often help by testing the remodeled plants, particularly in infected areas.

"During the last three decades an ever-increasing effort has been made all over the country to control disease through breeding," states Dr. Victor R. Boswell of the Division of Fruit and Vegetable Crops and Diseases, Bureau of Plant Industry of the U. S. Department of Agriculture.

"Not only do plant breeders attack these diseases that can be controlled only through creating new vegetables, but they also try to eliminate costly and troublesome spraying or other artificial controls," reports Dr. Boswell. "Where vegetables resistant to one or more diseases have been developed, we are now reluctant to put out new sorts that possess no resistance to those diseases."

Rust-Resistant Asparagus

An asparagus that would resist rust was one of the first plants bred specifically for disease resistance. Almost four decades ago, plants relatively free from rust were crossed with other promising varieties. Today their descendants are preferred not only for use in areas subject to rust, but also are grown extensively where no protection against rust is needed.

A wild Manchurian spinach was one of the first distant relatives to be brought from afar for use as a parent in overcoming a plant disease. After all commercial spinach varieties had been found susceptible to the devastating effects of the mosaic, this wild spinach, highly resistant to the disease, was located. It was crossed with a commercial type to produce an attractive disease-resistant spinach of good quality. One of the descendants of this Manchurian variety, Virginia Savoy, literally saved the fall and winter spinach-growing industry of the Middle Atlantic coastal states.

Tomato plants that were only partly resistant to wilt were the best plant breeders had to offer until 1940. About 1935 a wild tomato, virtually immune to the wilt, was found in Peru. But the fruit was small, only about as large as a currant, so the crop was of no value commercially. Its disease-resistance, however, was of great importance.

When this variety was crossed with one of the commercially popular varieties, the fruits of the hybrid were about as big as walnuts—still too small—but some of the hybrids kept the wilt-resistance of the small-fruited parent. The resistant selections were crossed to the large-fruited parent again and the resistant offspring selected. This was done three times, then large fields of the hybrids planted for further selection. In the remarkably short period of only four years (two generations per year) the Pan America variety, with sizable fruit, was created.

Many beans are now resistant to the common bean mosaic, but recently a new variety of mosaic arose to harass bean-growers. This fungus causes deformed leaves, interrupts the plant's growth, reduces the yield and may even kill the bean plant. A few varieties have now been developed that are resistant to the new virus, but the job of putting this resistance into more and more varieties continues.

Sweet Potato Difficulty

Sweet potatoes are particularly difficult to remodel because rarely, except in the tropics, sub-tropics and greenhouses, are seed actually produced. A number of good varieties have been produced for feed purposes, but so far no sweet potato that has disease-resistance as well as the shape, size, and color desired for home eating has been created.

The fight against diseases that destroy the beauty of flowers has not progressed as far as the battle against vegetable diseases. Here it is largely a case of the survival of the fittest, says Dr. S. L. Emsweller, also

TESTING DISEASE-RESISTANCE —Tomato plants are inoculated with a wilt fungus by immersing the roots in a water suspension of the disease organism.

BREEDING STOCK—The search for plant parents has uncovered this profusely fruiting potato.

of the Division of Fruit and Vegetable Crops and Diseases.

About two decades ago aster wilt became so widespread, for instance, that it threatened to wipe out entirely the China aster. The fungus, spread by tools, water and even the seed themselves, persists almost indefinitely. No drug or chemical is known to destroy it completely.

Today the aster is again gaining favor because seed that can be grown in infected soil is offered commercially. To develop wilt-resistant seed, test plants are given an extremely heavy dose of fungus. Those that survive supply seed for the next generation of plants to be exposed to the wilt. Their seed is ready for use around your home.

It is resistance, not immunity, that is developed in these plants. This resistance may be lost unless the plants are grown on infected soil and the selection process repeated frequently.

Some state departments of agriculture protect their flower growers by listing disease-resistant varieties. Other gardeners are tipped off by their local seedsman or neighbors that certain flowers cannot be grown in their vicinity.

Gladioli are attacked by corm rot, snapdragons are plagued by rust, and the beauty of chrysanthemums is dimmed by wilt and leaf spot. As plant breeders become more interested in flowers and as new, disease-resistant varieties are discovered, these and many other difficulties that be-devil flower growers will be eliminated.

Seeds of two varieties of corn, one of which is particularly resistant to bacterial wilt, and seeds of two types of China aster, one wilt-resistant, have been collected for you by Science Service. Just send 50 cents to Science Service, 1719 N St., N.W., Washington 6, D. C., and ask for the kit on disease-resistant plants.

Science News Letter, April 30, 1949

Heating *beehives* with electricity is under test in a northern state.

About half the American people do not know a single *cancer* symptom, a recent survey disclosed.

So-called *Newcastle disease,* now widely spread among American poultry flocks, seems to be less virulent in this country than abroad.

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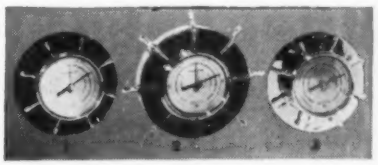

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MEDICINE

New Cancer Idea Advanced

➤ MORE lives may be saved from cancer as a result of a new idea of the disease advanced by Dr. L. Foulds of the Imperial Cancer Research Fund in London.

"Progression" is the key word in Dr. Foulds' concept. It gives a new explanation for much that has baffled doctors and medical scientists such as why a patient has a recurrence of malignant growth many years after the primary cancer was cured.

Chemical treatment of cancer may become more successful through further knowledge of "progression," Dr. Foulds suggested.

The kind of cancer development Dr. Foulds calls progression is independent of growth, duration or size of the tumor. It may be continuous or discontinuous, that is, off and on. Progression characters include growth, invasiveness, spread and responsiveness to environmental stimuli. These characters may develop independently of each other, Dr. Foulds finds.

A cancer that appears to the physician to be a small, early one may, according to progression, be advanced in aggressive characters. This would explain why the prognosis in early cancers is erratic. The small size of the tumor would lead to a hopeful prognosis for the patient after removal of the cancer, but the independently developed aggressive character of the growth might, contrary to the apparent outlook, lead to the patient's early death.

The unpredictable behavior of some tumors such as the spread of apparently harmless ones and the failure of locally malignant ones to spread, or metastasize, is accounted for by progression.

Long delayed recurrences after a primary cancer cure are, Dr. Foulds believes, due to progression independent of initial regrowth.

Ultimate failure following immediate favorable response to chemical treatment is due to progression in the tumor that has been checked but not entirely destroyed.

Dr. Foulds' report is based on study of several hundred mouse breast tumors. In this he found that multiple tumors in the same mouse each developed independently and that unpredictably different characters in a single tumor developed independently.

Further knowledge of progression is of prime importance for the management of human cancer, he declares in the 46th annual report of the Imperial Cancer Fund.

Science News Letter, April 30, 1949

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PHOTOGRAPHY

Fast Cameras Described

➤ PICTURES in one twenty-millionth of a second exposure are taken by a camera described in New York to the Society of Motion Picture Engineers by Dr. A. M. Zarem of the Stanford Research Foundation, Los Angeles. Other fast cameras were described by several scientists, but the Zarem camera is the fastest still-picture technique known.

The heart of the Zarem system is what scientists know as a Kerr cell. One form of this cell is a glass vial filled with nitrobenzene in which a pair of electrodes are placed. The cell is between two polarizing plates which are so placed that light emitted by one cannot ordinarily pass through the other. However, when high voltage is passed between the electrodes in the Kerr cell, the plane of polarization is changed, and the light emitted from it can pass the second plate and into the camera. Controlled timing of the voltage does the rapid-action lighting trick.

The Baird high-speed camera, that uses 16-millimeter film and can take motion pictures at rates up to 50,000 a second, was described by D. S. L. Durie of the Canadian National Research Council, Ottawa. Such speedy cameras are used to obtain motion pictures for review as slow motion pictures of various industrial actions, or of a rifle bullet in flight.

A camera developed by the National Advisory Committee for Aeronautics was explained by C. D. Miller of Battelle Memorial Institute, Columbus, Ohio. This camera employs the novel scheme utilizing rotating mirrors and a series of re-focusing lenses which are stationary to form a series of pictures on a non-moving film. These pictures are taken at rates up to one-half million per second. Motion pictures can be produced from the film.

High-speed motion pictures, taken by employing the principle of a multiple aperture focal plane camera, were described by Dr. Fordyce E. Tuttle of the Eastman Kodak Company.

A 20-lens high-speed camera, which takes 3,000 pictures per second on standard 35-millimeter film was described by Charles Wyckoff of the Massachusetts Institute of Technology. This particular camera was developed during the war at the U. S. Naval David Taylor Model Basin, Washington, D. C.

Science News Letter, April 30, 1949

Words in Science—
CHLOROMYCETIN

➤ FIRST member of the mold-germ-killer family of medicines to be made synthetically on a practical basis is chloromycetin. You say it clo-ro-mice-e-tin, stressing the clo and mice. It has been found effective against typhus, Rocky Mountain spotted fever, undulant fever and typhoid fever.

Originally made by a mold, *Streptomyces venezuelae*, found in the soil of Venezuela, it is now also being produced by synthetic process that is expected to lead to reduction in the price and to its more general availability.

Science News Letter, April 30, 1949

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PHYSIOLOGY

Ice Cream, Hot and Cold, Eaten To Test Body Effect

➤ A BIG dish of cold ice cream will, as you may have guessed, cool you but the same amount taken either lukewarm or very hot will not warm you, at least as measured by the temperature of the skin on your fingers.

The very hot, cold and lukewarm ice cream was eaten in exactly five minutes in large and small portions by 16 healthy young men in studies reported by Drs. Austin Henschel, Henry Longstreet Taylor and Ancel Keys of the University of Minnesota at the meeting of the Federation of American Societies for Experimental Biology in Detroit.

Object of the studies was to learn how hot and cold foods or drinks taken internally affect the body.

The large portions weighed about 14 ounces, the small ones about three and a half ounces. Temperatures of the mixture were about 17 degrees, 78 degrees and 149 degrees Fahrenheit. Barium sulfate had been added to the standard ice cream mixture, so that the doctors could tell by X-ray whether the temperature differences affected the activity of the stomach. There was no change in this as measured by the time it took the stomach to empty.

The sugar concentration in the blood increased by almost twice as much half an an hour after the cold ice cream as after the melting variety.

Finger skin temperature went down several degrees within 10 minutes after the cold ice cream and was not back to normal for almost an hour (50 minutes). The melting and hot ice creams had no effect on finger temperature.

Blood pressure and pulse rate both went up while the young men were eating the big portion of cold ice cream but returned to normal within two minutes after they had finished eating. The small portion of cold ice cream had no effect on blood pressure, pulse or skin temperature.

Science News Letter, April 30, 1949

Science Service Radio

➤ LISTEN in to a discussion on "Making Oil from Coal" on "Adventures in Science" over the Columbia Broadcasting System at 3:15 p.m. EDT, Saturday, May 7, Dr. W. C. Schroeder, chief of the Office of Synthetic Liquid Fuels, Bureau of Mines, will be the guest of Watson Davis, director of Science Service. Dr. Schroeder will tell about the two new coal-to-oil plants, the forerunners of a new basic industry in the United States, which will open the next day, Sunday, May 8, at Louisiana, Mo., less than 100 miles above St. Louis on the Mississippi River.

Science News Letter, April 30, 1949

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By Joseph Schillinger

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BOTANY

NATURE RAMBLINGS

by Frank Thone

Help Yourselves!

➤ CHILDREN, turned loose in the blossoming spring woods, are apt to indulge in an orgy of flower-picking, just from sheer exuberance of delight in the simple beauties their young minds can comprehend. It is a sad necessity for their elders to restrain them from gathering some kinds of flowers, lest none may be left for the next generation of children.

Violets, however, need no help from the parental or avuncular "don't". Little fingers may be permitted to take all they care to, of these favorites, so long as the plants are not pulled up roots and all—and with most species of violet that is not an easy thing to do.

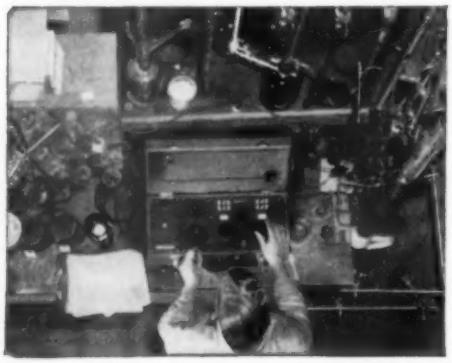
For free leave to pick violets without fear of ill consequences there are two reasons. Violets are perennials, coming up for several years from the same root-mass, and propagating by simple vegetative growth and spread. Perennials are usually deeper-rooted and more resistant to even wanton attack than are annuals.

The second safety-measure of the violet is even more interesting. Most flowers are dependent on the results of their own pollination for seeds. Not so the violet. While seed-pods may follow the pretty blue and white and yellow flowers, the main crop of seeds is produced later, from a second production of flowers which most of us would never recognize as such. These are short-stemmed, bud-like affairs that never open and have no petals; they shed their pollen internally on their own seed-producing parts and thus insure an abundant crop of seed as it were in secret.

Botanists have a special name for flowers of this kind. They call them "cleistogamous"; the word comes from two Greek roots that combine to mean "hidden marriage". And that is essentially what the whole strange proceeding amounts to.

With two kinds of flowers to produce seed, and vegetative increase to insure survival and supplement the plants' spread, it is not remarkable that violets are among the most successful of spring flowers. Not only do individual plants swarm in woodlands and over open fields; the number of separate species has evolved amazingly. There are at least 300 different kinds of violets, ranging throughout the temperate regions, in habitats ranging all the way from swamps to dry, rocky mountain heights.

Science News Letter, April 30, 1949



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PHYSIOLOGY

Codfish Get Heat Stroke

➤ FUTURE Antarctic and Arctic expeditions may benefit from experiments in which codfish will get heat stroke. The fish are Arctic cod which thrive in the icy waters of the far north. They are going to be dropped, by Dr. John Field of Stanford University, into waters comparable in temperature to those of the Pacific Ocean off the California coast.

Human swimmers may shiver in these waters on a July day, but to the cod they are hot water. Although he expects the cod to die, Dr. Field has reason to believe that they might survive if they could be adapted to the higher water temperatures by slow degrees. He will try this in later experiments.

Dr. Field's experiments are being carried on at Point Barrow, Alaska, under a contract with the U. S. Office of Naval Research which is interested in the mechanisms by which animals and fish adapt themselves to extremes of heat and cold. He reported some of them at the meeting in Detroit of the Federation of American Societies for Experimental Biology.

Arctic cod, he found, can live in waters as cold as three degrees below freezing because their metabolism, or rate of bodily chemical reactions, holds up well at low temperatures.

The metabolism of a cod does not fall off as rapidly with temperatures below 50 degrees Fahrenheit as does that of the black bass or goldfish or the isolated brain of a white rat. Above 75 degrees, however, the metabolism of the cod falls off rapidly, which is why those scheduled for exposure to warmer waters are expected to die of heat stroke.

Dr. Field and his assistant, Clarence N. Peiss, found out about the cod's metabolism by removing the brain and keeping the brain tissue alive in an atmosphere of oxygen and salt solution made to resemble the fishes' blood plasma. The brain's consumption of oxygen was then carefully measured. At each temperature studied, the rate of oxygen consumption by the Arctic cod brain was higher than that of temperate zone fish of comparable body size, and of white rat brains.

Science News Letter, April 30, 1949

100 WAYS TO SAVE MONEY WHEN YOU BUY A CAR

An amazing new $1.25 book entitled *"How To Be An Expert Car Buyer"* is just what the public has been waiting for. It enables *anyone* to easily pick out a good car and save money doing it. Exposes 36 tricks used to defraud *new & used* car buyers. Shows how to avoid buying disguised taxis, costly lemons, patched-up wrecks. Gives 56 easy car tests. Covers *fair* prices, trade-ins, financing, insurance, repair, operating costs, etc. It's packed full of authoritative money-saving inside information. Just *one* fact can save you $100. Acclaimed by experts! R. J. Schmunk, Pres. AAA: *"Even a hasty reading of your valuable book should prevent most people from falling into the most obvious mistakes."* 96 pp Illus. Only $1.25; COD $1.50. Money-back guarantee. Be sure of having this priceless information when you need it by ordering *today* from Macys, Marshall Field, Gimbels, bookstores, Sears Catalog or: *CUMMINGS ENTERPRISES, Publishers; Keystone State Bldg., Phila., 7T, Pa.*

• Books of the Week •

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ADVANCED SURVEYING AND MAPPING—George D. Whitmore—*International Textbook*, 619 p., illus., $5.00. Provides material for a college course covering such subjects as geodetic surveying and mapping, precise surveying in city work, and aerial photogrammetry.

THE ECONOMIC PROBLEMS OF FORESTRY IN THE APPALACHIAN REGION—William A. Duerr—*Harvard University Press*, 317 p., illus., $5.00. A regional approach aimed at defining the field of the economics of forestry.

EXCERPTS FROM RECURRING CYCLES OF FASHION—Agnes Brooks Young—*Foundation for the Study of Cycles*, illus., paper, $1.00. A brief study of women's fashions since 1760, showing that there are three recurring cycles per century. Originally published by *Harper* in 1937.

GREGORIO, THE HAND-TREMBLER—Alexander H. Leighton and Dorothea C. Leighton—*Peabody Museum of American Archaeology*, 177 p., paper, $2.50. This psychobiological personality study of a Navaho Indian who practices hand-trembling as a religious rite and a form of divining, is part of long-time study of the Ramah Navaho and the effect of their culture on the individual.

GUIDING HUMAN MISFITS—Alexandra Adler—*Philosophical Library*, 114 p., $2.75. A guide for those who come in contact with the misfits of human life. Practical application of individual psychology.

HANDBOOK OF CHEMISTRY AND PHYSICS—Charles D. Hodgman, Ed.-in-Chief—*Chemical Rubber*, 31st ed., 2737 p., illus., $6.00. New edition of this important reference work.

HUMAN RELATIONS IN A CHANGING WORLD—Alexander H. Leighton—*Dutton*, 354 p., $4.50. Observations on the practical uses of social sciences, largely the result of a visit by the author to Hiroshima.

INTRODUCTION TO GAS-TURBINE AND JET-PROPULSION DESIGN—C. A. Norman and R. H. Zimmerman—*Harpers*, 286 p., illus., $5.00. Explains in detail the performance and the design of gas turbines and jet-propulsion apparatus.

THE KANSAS STORY ON UNESCO—*Gov't Printing Office*, 41 p., illus., paper, 20 cents. How Kansas has organized a State Council, supplemented by local councils in support of UNESCO's programs and purposes.

A NEW THEORY OF HUMAN EVOLUTION—Sir Arthur Keith—*Philosophical Library*, 451 p., $4.75. The results of many years study on the nature and habitat of man's pre-human ancestors.

NUTRITION AND THE SOIL: Thoughts on Feeding—Lional James Picton—*Devin-Adair*, 374 p., illus., $4.00. An examination of our nutritional practices.

PARAGUAY—Harris Gaylord Warren—*University of Oklahoma Press*, 393 p., illus., $5.00. Interestingly written history of a South American country with romantic past almost completely neglected by historians.

PRESENT CONCEPTS OF REHABILITATION IN TUBERCULOSIS—Norvin C. Kiefer—*National Tuberculosis Association*, 398 p., $3.50. The result of the author's monumental research into 1,007 papers covering more than 10 years of rehabilitation activity.

PROCEEDINGS OF THE INTERNATIONAL CONGRESS ON POPULATION AND WORLD RESOURCES IN RELATION TO THE FAMILY—*Family Planning Association of Great Britain* (U. S. distributor: *Planned Parenthood Federation of America*), 246 p., paper, ten shillings and sixpence (approx. $2.60). Leading authorities discuss the many problems of family planning, at a meeting in Cheltenham, England, August 1948.

PSYCHIATRY FOR THE MILLIONS—Benzion Liber—*Fell*, 307 p., $2.95. To help the layman understand mental illness especially in the lighter or incipient forms as they affect one out of every 20 of us.

PSYCHOLOGY, Occupational Abstract No. 119—George J. Dudycha—*Occupational Index*, 6 p., paper, 50 cents. A composite summary of the available literature in 264 references.

THE PSYCHOLOGY OF EVERYDAY LIFE—James Drever—*Methuen* (U. S. distributors: Sherwood Press), 11th ed., 180 p., $3.00. Includes a supplementary chapter but is otherwise essentially as published in 1921. Of British origin.

PUBLIC HEALTH IN THE WORLD TODAY—James Stevens Simmons, Ed.—*Harvard University Press*, 332 p., $5.00. Presents up-to-the-minute symposium of what is being done, thought, and planned for community, national, and world public health. The outgrowth of Harvard's Health Forums.

TABLES OF BESSEL FUNCTION OF FRACTIONAL ORDER, Vol. II—Computation Laboratory of the National Applied Mathematics Laboratories—*Columbia University Press*, 365 p., illus., $10.00. Functional values are given either to ten decimal places or ten significant figures.

TORCHBEARERS OF CHEMISTRY—Henry Monmouth Smith—*Academic Press*, 270 p., illus., $8.00. Portraits and brief biographies of scientists who have contributed to the making of modern chemistry.

THE UTILIZATION OF SUGAR CANE BAGASSE FOR PAPER, BOARD, PLASTICS, AND CHEMICALS—Clarence J. West—*Sugar Research Foundation*, 20 p., paper, free upon request to publisher, New York. An annotated bibliography.

THE VALLEY OF FLOWERS—Frank S. Smythe—*Norton*, 325 p., illus. (16 color plates), $5.00. An exciting narrative of four months in the Himalayan mountains by a professional mountain climber.

WHAT BUTTERFLY IS IT?—Anna Pistorius—*Follett*, 24 p., illus., $1.25. A beautiful and delightful book for boys and girls. An excellent introduction to a pleasant hobby.

Science News Letter, April 30, 1949

ENGINEERING

New Device Tests Steel

➤ HIDDEN magnetic properties of steels which make them suitable for certain uses but not for others are determined by an improved device revealed in New York by the United States Steel Corporation. It can determine steel suitable for making automobile fenders and bottle caps and other steel which may be used in the cores of electric transformers.

The new instrument, which utilizes two strong electromagnetic coils, is called a torque magnetometer. The sample for testing is a circular piece of sheet steel about an inch in diameter. When it is placed in the magnetic field of the coils, it will rotate to a particular position, and then come to rest. This rotation accounts for the term torque in the name of the device.

This behavior on the part of the disk is due to the minute crystals of iron of which the sample is composed. They have certain directions in which they are easily magnetized. The inherent magnetic property of the metal in the disk determines the resulting turn or torque.

In the magnetic field of the coils, the crystallites want to turn the sample disk so that one of the directions of easy magnetizing is parallel to the field. If the preferred directions in the sample were uniformly distributed in all directions, there would be no torque in the disk. But in most kinds of sheet steel these preferred directions are more or less concentrated about certain directions in the sheet.

The practical use of this magnetometer, developed by Donald S. Miller of the steel corporation's research laboratory, is to select steel for specific applications. Steels with little magnetic directional properties are preferred if deep bottle or other caps, or rich curves as in a car fender, are to be formed. A strong directional indication is preferred in steel of a high silicon content to be used in cores of transformers. Minimum directional properties are desired in the same type of steel for the construction of electric motors and generators.

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TINY NEON GLOW LAMP, said to be the world's longest-burning electric light, will produce a small amount of light for about three years, and consumes only one twenty-fifth of a watt of electric current. It is designed for electrical household and other appliances to indicate that current is on or off.

Science News Letter, April 30, 1949

LIQUID STAINLESS steel is made of microscopic flakes of the metal incorporated in a liquid plastic with a solvent to thin it so that it can be applied by brush or spray. It can be used on wood or metal surfaces exposed to fresh or salt water, and to air containing acids and alkalis.

Science News Letter, April 30, 1949

WATERING CAN for home use, made of colored plastics and shaped like a broad flat-bottom teapot, has a long tapering spout which permits water to get into out-of-the-way places without spilling a drop on the floor or furniture. A teapot-type handle makes it easy to hold.

Science News Letter, April 30, 1949

ELECTRIC RAZOR, for a wet shave with the use of shaving soap, uses regular blades driven in a side-to-side reciprocating motion. The razor, shown in the picture, is

operated by an electromotive drive, has a power consumption of two watts, is noiseless and creates no radio interference.

Science News Letter, April 30, 1949

SPORTSMAN JACKET for those engaged in water sports, including fishing and sailboat racing, resembles an ordinary weather breaker but has within it air-holding pockets made of a rubber-like plastic that can be inflated by mouth. This inflated life preserver extends around the neck and over the chest.

Science News Letter, April 30, 1949

FISH GRIPPER and hooded scaler permit a fisherman to clean and scale his catch indoors without making a mess. The gripper is an aluminum tool which is inserted in the mouth of a fish and spread by thumb pressure, while the scaler is a separate tool which catches the scales as it is rubbed over the body.

Science News Letter, April 30, 1949

ROOF RAFTER lengths and cuts are calculated quickly and accurately with a pocket-size flat plastic tool containing two dials which, when properly rotated and set, give the desired information. The instrument makes it possible to design a roof with any pitch from 14 to 57 degrees.

Science News Letter, April 30, 1949

MINIATURE MICROPHONE, unprecedentedly small in size and weighing less than a quarter of an ounce, is mounted on a tapering shaft but is adaptable to all types of stand mountings or overhead suspension. It permits a speaker or artist to be seen as well as heard.

Science News Letter, April 30, 1949

Do You Know?

There are 10,000 geysers, hot springs and steam vents in *Yellowstone National Park.*

Distribution by *helicopter* has been found the best economical method of seeding burned-over rough forestry areas.

One pound of *uranium* in the atom-splitting process would release about the same energy as the combustion of 1,300 tons of coal.

Old men and women, as well as babies, may need a *feeding formula;* one authority states that oldsters seem to have a tendency to eat a diet excessively low in proteins.

Charges for *sewer service* in some American cities are based on the metered water used by the building, on a fixed percentage of the water bill, by fixed uniform rates, or on the number of plumbing fixtures.

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